



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/635,651	08/07/2003	Taro Ikeda	033082R167	8788

441 7590 09/26/2005

SMITH, GAMBRELL & RUSSELL, LLP  
1850 M STREET, N.W., SUITE 800  
WASHINGTON, DC 20036

EXAMINER
----------

ALEJANDRO MULERO, LUZ L

ART UNIT	PAPER NUMBER
----------	--------------

1763

DATE MAILED: 09/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/635,651

Applicant(s)

IKEDA, TARO

Examiner

Luz L. Alejandro

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 August 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213:

**Disposition of Claims**

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) 1-4, 12 and 13 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 5-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 0805, 0204, 0803.

- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Election/Restrictions***

Applicant's election of group II in the reply filed on 8/24/05 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claims 1-4 and 12-13 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim.

### ***Specification***

The claims are objected to because the words of the claims are crowded (too closely together) making reading difficult. Substitute claims with better spacing between the words is required.

A substitute specification in proper idiomatic English and in compliance with 37 CFR 1.52(a) and (b) is required. The substitute specification filed must be accompanied by a statement that it contains no new matter.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

Art Unit: 1763

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 5-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Raaijmakers et al., U.S. Patent 5,460,689 in view of Forster et al., EP 0 685 873 A1 and further in view of Qian et al., U.S. Patent 6,447,636.

Raaijmakers et al. shows the invention substantially as claimed including a plasma processing method for performing plasma processing by using a plasma processing system comprising a chamber for housing a substrate-to-be-processed; a belljar 12 disposed on the chamber in communication with the chamber and having a side wall and a top wall of an insulator; a conducting mount 18 disposed in the chamber, for the substrate to be processed to be mounted on; an antenna means 28 disposed on the outside of the side wall of the belljar, for generating induced electromagnetic fields in the belljar; a first high frequency electric power source 40 for supplying high frequency electric power to the antenna means; gas supply means (34,36a,36b) for supplying a plasma generating gas which is dissociated by the induced electromagnetic fields generated by the antenna means to be plasma, and a processing gas for the plasma processing; and a second high frequency power source 42 for applying high frequency power to the mount, high frequency electric power being supplied from the second high frequency electric power source to the mount to generate electric fields vertical to the substrate to be processed between the mount and the conducting member and generate plasmas.

Raaijmakers et al. does not expressly disclose a flat conducting member disposed above the top wall, opposed to the mount, being grounded, a Faraday shield

Art Unit: 1763

disposed between the antenna means and the belljar, heating the substrate, and high frequency electric power supplied to the mount and then supplied to the antenna.

Forster et al. discloses a conducting member 180 disposed above the top wall for capacitively coupling plasma to the chamber (see fig. 3 and its description). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Raaijmakers et al. so as to have a flat conducting member disposed above the top wall because this allows for inductive as well as capacitive coupling in the apparatus which enhances plasma ignition.

Regarding the Faraday shield, heating the substrate, and high frequency power supplied to the mount and then high frequency power supplied to the antenna, Qian et al. discloses initially providing bias or RF to an electrode 220 and substrate power source 106 followed by providing high frequency power to the antenna 102 (see, for example, col. 10-line 29 to col. 11-line 10), and a Faraday shield 210 between the antenna and the chamber (see fig. 1 and its description), and a substrate heater (see col. 4-lines 29-37). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Raaijmakers et al. modified by Forster et al. to have a faraday shield between the antenna and the chamber, to heat the substrate while processing, and to apply the high frequency power as disclosed by Qian et al. because in such a way capacitive coupling from the antenna can be prevented from entering the chamber, the plasma can be effectively ignited, and the process can be more effectively controlled by controlling the substrate temperature.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Raaijmakers et al., U.S. Patent 5,460,689 in view of Forster et al., EP 0 685 873 A1 and further in view of Qian et al., U.S. Patent 6,447,636 as applied to claims 5-8 above, and further in view of Brcka, U.S. Patent 6,652,711.

Raaijmakers et al., Forster et al., and Qian et al. are applied as above but do not expressly disclose using the plasma processing for removing natural oxide films from the substrate. Brcka discloses using a plasma system for removing natural oxide from the substrate (see col. 1-lines 15-19). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Raaijmakers et al. modified by Forster et al. and Qian et al. so as to perform a process to remove native oxide from a substrate because as disclosed by Brcka, a plasma apparatus is commonly used for such a purpose.

Claims 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Raaijmakers et al., U.S. Patent 5,460,689 in view of Forster et al., EP 0 685 873 A1 and further in view of Qian et al., U.S. Patent 6,447,636 and Brcka, U.S. Patent 6,652,711 as applied to claim 9 above, and further in view of Liu et al., U.S. Patent 6,776,170.

Raaijmakers et al., Forster et al., Qian et al., and Brcka are applied as above but do not expressly disclose using argon and hydrogen to remove the native oxide. Liu et al. discloses removing native oxide using hydrogen and argon gas (see col. 3-line 66 to col. 4-line 14). In view of this disclosure, it would have been obvious to one of ordinary

Art Unit: 1763

skill in the art at the time the invention was made to modify the process of Raaijmakers et al. modified by Forster et al., Qian et al., and Brcka so as to remove the native oxide using hydrogen and argon gasses because Liu et al. teaches that such gasses are suitable for the intended purpose of removing native oxide from a substrate.

Concerning claim 11, note that in Raaijmakers et al. the first high-frequency electric power source is connected to an upper end portion of the antenna means.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luz L. Alejandro whose telephone number is 571-272-1430. The examiner can normally be reached on Monday to Thursday from 7:30 to 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1763

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Luz L. Alejandro  
Primary Examiner  
Art Unit 1763

September 19, 2005